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EDITORIAL

"WHAT SORT OF PEOPLE DO THEY THINK WE ARE?"

—The Prime Minister.

In a recent debate in the House of Lords on the Government's milk policy a member is reported to have said that he favoured both the long-term and short-term policies. He said that the long-term policy was not enough and that "It would take several decades before anything like complete cleanliness was effected at the cow end." He attributed this delay, amongst other things, to "The status of the veterinary profession and the paucity of its numbers." His apparent remedy was "We must do more to encourage intelligent men and women to enter the ranks of veterinary service."

Now it is not clear whether these remarks referred to the Government's whole-time veterinary service, to the part-time service, or to the profession as a whole. Did the speaker intend to infer that the members of the profession, past or present, or maybe those who seek to enter it in the future, are lacking in intelligence or that the status of the profession is too low, and its numbers too small, for the great tasks envisaged? If so, we must contest such statements with every means within our power. The status of a profession is the direct reflexion of the conduct and ability of its individual members, and that in turn is exemplified in the appreciation shown by the public. The preliminary and professional educational requirements are such that only those of reasonable intelligence can complete the course. As regards the numerical sufficiency of the profession, how can such positive statements referring to "The paucity of its numbers" be made with any reasonable degree of accuracy when it is a

well-known fact that the services of many practitioners have not been utilised even within reasonable distance of their full extent.

When such statements are made to the disparagement of the profession we would reply in the words of our great Prime Minister: "What sort of people do they think we are?"

We are living in momentous days, when many individual interests have to be renounced in the common weal. It is a time of great planning and reorganisation for a visionary future which no one can forecast with any degree of certainty. There are plans to reform, to correct and to regiment, and the busiest planners are those who would design the other fellow's affairs. It would appear that the veterinary profession has not been neglected in this sphere. Whatever differences may exist across the table within the profession, and they are often salutary and indicate a refreshing or wholesome vigour in our affairs, one thing stands out plainly, and it is this, that in matters of great moment we must subjugate such differences and stand together in a united front to those who would appoint themselves arbiters of our destiny. History, competence and common-sense logic substantiate that we have a sound and worthy case. Before the last war a veterinary surgeon, being a professional man, was supposed to be incapable of holding high administrative office. One would think that the appreciation of the great work of the R.A.V.C. in that war would have dispelled such an allegation for ever. Such does not appear to be the case. If those who would plan present or future activities of veterinary surgeons will only seek advice and assistance from those who are most competent to give such help they will not look in vain, for we have behind us many years of scientific attainment and sound practical experience in our art and science. The profession has, by its own efforts, advanced to a state of knowledge and skill which equals most and surpasses many others. For long this has been recognised by some great men in other spheres, but it would appear that the great mass are still in ignorance of the capabilities of a profession which has behind it a history of one hundred and fifty years of sound progress, and whose rolls have been embellished by such names as Moorcroft, Percival, Youatt, Dick, McCall, Flemming, McFadyean, Stockman and Hunting, and many others. These were truly great men and made their indelible mark on the immortal rock of knowledge.

The profession has produced, and will produce, men who can be compared favourably with those of any other branch of science.

In the past the only bar to still greater progress has been financial starvation or cramp and the apathy of those who should have encouraged and helped. There are signs that this era is passing if one can judge by the increasing interest which is being taken in our affairs by those outside the profession. We can truly say the men are at hand; all that is necessary is the material facilities and a reasonable chance to prove our value. Given such opportunity, we can undertake any task within our province, and we can assure the House of Lords that we shall not fail on account of status, paucity of numbers or intelligence.

General Articles

SPIROCHÆTOSIS OF FOWLS IN INDIA—II

By M. K. SREENIVASAN and N. S. SANKARANARAYAN,
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(*Concluded*)

Methods of Immunisation, Treatment and Immunity.

(2) *Duration of Immunity.* Few workers have reached any definite conclusion regarding the period and nature of immunity in birds recovered from spirochætosis. Kliger *et al.* (1938) state that immunity lasts for six months after serum-simultaneous inoculation. Catanei (1926) found that inoculation with the Algerian virus produced a strong immunity in fowls for thirteen to twenty-one months, while the Brazil virus gives solid immunity in canaries for 7½ months. Reinoculation some months later does not, however, increase or prolong this immunity.

TABLE VI

Immunity Test

No. of birds tested	*Date and method of immunisation*	*Date and method of retest*	*Interval between immunisation and retest*	*Result of retest*	*Remarks*
10	26/11/40. Virulent blood and atoxyl	4/3/41. Virulent blood	97 days	All immune	Controls reacted
5	22/3/41. Virulent blood and atoxyl or soamin*	5/4/41. Left in tick-infected run	43 days	None developed disease	*3 birds immunised with soamin and 2 atoxyl. 5 unimunised birds left with these in the run died of spirochætosis
6	10/8/41. Virulent blood and sulfarsenol	28/9/41. 3 with chicken- and 3 with adult-blood	48 days	All immune	Controls reacted
4	23/7/41. ditto	28/9/41. Virulent blood	66 days	ditto	ditto
3	27/6/41. ditto	28/9/41. ditto	91 days	ditto	ditto
2	26/11/40. Virulent blood and atoxyl	16/4/41. Left in tick-infected cage	141 days	ditto	ditto
5	29/4/41. Refrigerated blood 28 to 45 days	27/11/41. Virulent blood	7 months	ditto	ditto
5	22/3/41. Virulent blood and soamin	26/11/41. ditto	8 mths. 4 days	One reacted and died	ditto
4	26/7/41. Virulent blood and sulfarsenol	26/3/42. Virulent chicken blood	8 months	All immune	ditto
3	26/11/40. Virulent blood and atoxyl	24/9/41. ditto	10 months	All reacted and one died	ditto
8	10/8/41. Virulent blood and sulfarsenol	30/6/42. Virulent blood	10 mths. 20 days	All reacted	Treated with sulfarsenol and recovered
7	10/8/41. ditto	6/7/42. ditto	Abt. 11 mths.	ditto	ditto
2	27/6/41. ditto	6/7/42. ditto	12 mths. 9 days	Both reacted	ditto
4	24/5/41. ditto	30/6/42. ditto	13 mths. 6 days	All reacted	ditto

Note.—The immunity is found to be solid definitely up to seven months; at eight months or a little over, out of nine birds tested one reacted and died. All the birds at ten months and over had no immunity.

To test the duration of immunity, birds were selected at random from batches immunised at different periods by different methods. They were exposed to infection, both natural, by keeping them in tick-infected cages and runs, and experimental, by injecting them with virulent strains of spirochætes. Their blood was examined daily for a period of seven days after artificial infection and for ten days after exposure to natural infection.

A series of tests is shown in Table VI. Clearly, immunity does not last for more than eight months, whatever the breed, age, method of immunisation or degree of reaction to immunisation.

Kroó and Orbaneja (1935) consider that a strong inherited immunity can be built up in chickens hatched from eggs laid by fowls experimentally inoculated with spirochætes. The blood serum of chickens from such eggs was found to inactivate the spirochætes, as also were the white and the yolk of eggs laid by experimentally infected fowls. In the course of the present work six chicks were hatched from eggs laid by hens which had been experimentally immunised a short time previously. When three to five weeks old, the six chickens were inoculated with virulent blood. Four of them developed the disease and two died.

Before arriving at a conclusion about the degree of immunity acquired by vaccination with a particular strain of spirochæte, it would be necessary to test this with strains from other parts of India. In this connection, Galli-Valerio (1908) reports that the Tunis virus is probably identical with the Sudan variety, but that the African and Brazil viruses are different.

Comte and Bouquet (1908) tested the Tunis and Brazil strains and found that fowls immune to Brazil virus were not immune to the Tunis virus.

Brumpt (1909) experimented with a virus strain from Senegal. Fowls recovered from the Senegal strain were immune to that virus but not to a Tunisian strain. Nor did a Somaliland virus confer immunity against the one from Senegal. Blaizot (1909, 1910) reports that young and old birds may react differently to the same strain.

Hindle (1911) believes that Balfour's granules result from nuclear degeneration and that they are characteristic of infection with the Sudan and South African viruses.

Gonder (1914) also found some difference between Brazil and Sudan strains. Fowls recovered from the Brazil strain were not immune to the Sudan strain, but those recovered from the Sudan strain were immune to the Brazil strain. Gonder found that the passage of a particular strain of spirochæte through a Javanese sparrow could break down the immunity of fowls to this strain. Similarly, a sparrow that had recovered from an attack of spirochætosis was only immune against the same strain so long as this was maintained in sparrows, but were still susceptible once the spirochæte strain has been passed through a fowl.

Four ducks were inoculated with the stock strain of spirochætes and all suffered from a severe form of the disease. When, however, the spirochætes from ducks were passed through two healthy fowls, the behaviour of the strain was changed in that the fowls showed only a few spirochætes in the blood and recovered spontaneously. At its third sub-passage in fowls, this altered strain

completely failed to cause infection in fowls, though they retained their susceptibility. Such variations in strains and the different behaviour of the same strain in young chickens and in adult birds, as referred to above, makes large-scale attempts at immunisation against spirochætosis an exceedingly difficult problem. It is not known whether there are any differences among the viruses from different parts of India. In the absence of definite knowledge it may be wise to use local strains where possible for immunisation and to be cautious in introducing strange birds into an immunised flock.

Summary

(1) Various methods for immunising fowls against spirochætosis have been described. Infection associated with chemotherapy has been found to be the best and safest method. For this purpose, atoxyl, soamin, sulfarsenol, and, to a less extent, salvarsan, have been used. Atoxyl and soamin were found to be toxic and not suitable either for immunisation or treatment, especially when birds are old and fat and affected with gout. Sulfarsenol has been used for the immunisation of more than 1,000 birds and the mortality has been less than 1 per cent. The dose fixed for immunisation, irrespective of breed, age and bodily condition, is 0.015 to 0.02 gm., though the drug is non-toxic even at a dose of 0.05 gm. Birds under immunisation with sulfarsenol do not lose weight, as is the case with the other two drugs. Sulfarsenol can also be used as a prophylactic.

(2) Immunity was found to be strong for about eight months after artificial infection. Whether serviceable immunity can be prolonged is a point to be determined.

(3) A suggestion that chickens hatched from eggs laid by immune hens possess some immunity has not so far been confirmed.

Acknowledgment

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The illustrations are the work of Mr. Ahmed Baksh, Artist to the Institute.

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EXPERIENCES OF AIR BOMBARDMENT IN AN URBAN AREA

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In this article we shall try to describe our practical experiences with horses during air raids. Our area comprised five Metropolitan Boroughs, the City of London and part of the Port of London. The total horse population has remained fairly constant at about 5-7,000, in studs ranging from one to 500, the average being 20-25.

For arranging our air raid precautions system we had the help of N.A.R.P.A.C. and particularly of Dr. Wooldridge and the late Col. Stordy. In so far as our region was concerned we found N.A.R.P.A.C. a success.

The pivot of our organisation was our headquarters, the veterinary surgeons' premises, where there was always a veterinary surgeon in attendance fully equipped with ambulances, drugs, dressings, decontamination outfit, etc. Every borough had another major dressing station like an R.S.P.C.A. or P.D.S.A. clinic or Police Green Yard in charge of a fully trained layman, usually late R.A.V.C.

Every stud above ten horses was equipped with a N.A.R.P.A.C. first aid box and the man in charge, if not a late R.A.V.C. man, was trained by special

lectures. He afterwards had to pass an examination and was made an Animal Guard and his stud was declared a First Aid Post.

The total organisation consisted of two veterinary surgeons in day-time and one at night, and about fifty fully trained men. We had eight horse ambulances, always manned by fully trained animal guards, six major dressing stations, and twenty-eight first aid posts.

All information concerning A.R.P. for horses was put into a leaflet and a copy of it was given to every police constable, warden and fireman in the district.

Unfortunately, a bomb put our headquarters out of action during the first raid and after a few days we had fitted out a relatively bomb-proof place as a complete horse infirmary, with ambulance and all facilities for dressing and operations, etc., during air raids. Boxes and attendants, decontamination utensils, telephone, etc., were all installed so that we were capable of dealing with any emergency.

All these arrangements were made in close co-operation with N.A.R.P.A.C., the local authorities concerned, and the Metropolitan and City Police. The co-operation of the police forces proved particularly valuable. From the Superintendent down to the War Reserve and Flying Squad man they showed an active interest and displayed great courage in helping injured animals, keeping up our communications, and clearing away innumerable difficulties which an organisation like that is subject to.

The labour expended in building up this organisation in the first year of war was well repaid by the fact that no animal was left unattended and that despite heaviest pressure and difficult communications. This was only possible by the close co-operation of all the people concerned for the good of the horse, a fact which was recognised by the National Horse Association when they decorated our Animal Guards.

General advice given to horse owners, prior to air raids, by the N.A.R.P.A.C. booklets and ourselves was not followed. Owing to the general custom and shortage of space, oats, straw and hay were stored on top of stables or close to them and caused some casualties. Quick-release devices were not installed to any large extent owing to the high cost, and we often experienced great difficulties in releasing horses which were trapped and had been secured by ropes, etc., and we actually lost horses over it. Another difficulty was the refusal of owners to bed their horses on peat, which would have prevented the straw on which horses stood from catching fire. In spite of all these things none of our personnel was seriously injured.

Actual Accidents

This is not a complete list of all our incidents but all cases were seen by the writer personally and are fairly representative.

C_1.—A stud of twenty-two horses was stabled in an iron-concrete stable with a loft. A large bomb fell and caused part of the roof to collapse, killing five horses instantaneously, all from broken spine in various parts of the body. None of the surviving horses was injured.

C_2.—About six months later the same stud, stabled in the remnants of the

C_2.—About six months later the same stud, housed in the remnants of the stable, received a direct hit from an H.E. bomb, which killed the complete stud of nine horses. As it was about a week before the carcases were salvaged no accurate post-mortem examinations could be held, but four animals were killed by blast and the other five by being struck by parts of the building, mainly in the region of the spine. Again death was instantaneous and we were unable to do anything.

E.—Twelve horses were stabled underneath an old loft containing straw. An incendiary bomb set fire to the straw and all horses were burnt, so that no useful post-mortem could be made.

F.—Twenty horses of a large stud were stabled underneath a railway arch. An H.E. bomb penetrated the arch and exploded near the open end of it. Eleven horses were injured. Three received slight cuts about the body, but eight had to be retained for treatment and lost some weeks of work.

(1) Abrasions on back and shoulder dressed daily with ung. borac. Returned to work after ten days.

(2) Contusion middle line of the back. Hot fomentations were applied and it returned to work fourteen days later.

(3) Abrasions on head, neck and back. Discharged after sixteen days.

(4) Contusion on back. Discharged after a week.

(5) Slight contusion on back. Discharged after four days.

(6) Lacerated and contused wound near quarter, causing a permanent sinus which did not yield to treatment. No foreign body was found in the bottom of it. Autogenous vaccine reduced the discharge so that after twelve months it resumed work, but there is still a slight discharge.

(7) No injury, but horse became very nervous. After a prolonged rest at grass it resumed work.

(8) Contusions on head. Discharged after ten days.

G.—About nineteen horses were stabled in the first floor of a brick building. A large bomb exploded causing one wall and part of the roof to collapse. Two horses received slight wounds on the chest and quarters but were able to resume work after a week. A chestnut mare was struck by a piece of stone on the near scapula. A traumatic osteo-arthritis of the scapula and humerus articulation resulted. After three months' treatment on orthodox lines she had to be destroyed as there was no hope of recovery, and the post-mortem examination confirmed our diagnosis.

H.—A stud of twelve horses was stabled in a shack when an H.E. bomb demolished three adjoining houses. The stable collapsed on to the horses, but, being very light, caused no injury. One horse, however, while being buried, trod on a nail which penetrated the corona-pedal articulation, causing an open joint, and had ultimately to be destroyed.

K.—Fifteen horses were stabled in a very old building which was hit by an H.E. bomb. All horses escaped injury except one which hit its jaw against the manger, causing an osteo-arthritis which kept it from work for two months.

L.—An H.E. bomb fell near an old shack which housed three ponies. While two only suffered abrasions after being buried for ten hours, the third horse was hit by a beam across its back and had to be destroyed.

M (see diagram).—A stud of 107 horses was housed in two modern stables and six loose boxes—eighty-nine in one stable, fifteen in the other stable, and three in the loose boxes. The hay-loft above the stables had been burned out in an earlier raid and the floor above the stable had been reinforced with iron-concrete. A large bomb hit the stable containing seventy-six horses. It hit the iron-concrete on the spot indicated in the diagram. The whole roof collapsed in one part of the stable and many horses were affected by the blast in other parts of all stables. In the part marked K all but two horses were killed. The total casualties in this incident were twenty-four killed, nineteen injured. Of the horses which were killed five died from the effects of blast, while nineteen died of fractures and internal injuries due to the heavy iron-concrete collapsing and burying them.

The injured horses suffered from the following:—

(1) Lacerated and contused wound surmounting near parotid gland and minor wounds near neck and near-side of back. Yielded to surgical treatment and after two months went to work again without ill results.

(2) Comminuted fracture of nasal bones and minor injuries of haunch. Yielded to treatment and returned to work after twelve weeks. Facial cuts, also cuts and bruises to lips and maxilla, and lame off hind. Returned to work after six weeks. The horse died two years later from a cerebral hæmorrhage.

(4) Compound comminuted fracture of the parietal bone near-side of head, deep puncture wound in the region of the near last rib, lame off hind. It had to be destroyed on the twelfth day.

(5) Comminuted compound fracture middle line of spine surmounting and involving the supraspinal processes of the lumbar vertebræ and other minor injuries. This wound contained a piece of glass. It recovered after five months under orthodox treatment.

(6) Lacerated and contused wound near-side of chest wall near loin and quarter.

(7) Lame near hind, minor injuries to frog outside heel.

(8) Minor injuries to haunch near shoulders and off quarter, mostly abrasions.

(9) Bruises and abrasions on trunk.

(10) Cuts near shoulder hock and tibia and off quarter.

(11) Abrasions on near shoulder and back, off eye, near stifle, off loin and quarter.

(12, 13, 14, 15, 16, 17, 18).—Minor skin injuries. The last twelve cases returned to work within the fortnight after orthodox treatment.

(19) Horse with a shrapnel wound on the off-side of the poll, which developed into a fistula, necessitating its destruction after one month.

N.—Incendiary bomb set the straw alight in a large stable housing eighty-two horses. All but three horses came out of the fire unscathed. The three horses were burnt but made a good recovery after two months.

O.—An incendiary bomb hit a pony standing in the street during a day raid. It hit the pony's off-side knee-joint completely fracturing it. The pony had to be destroyed.

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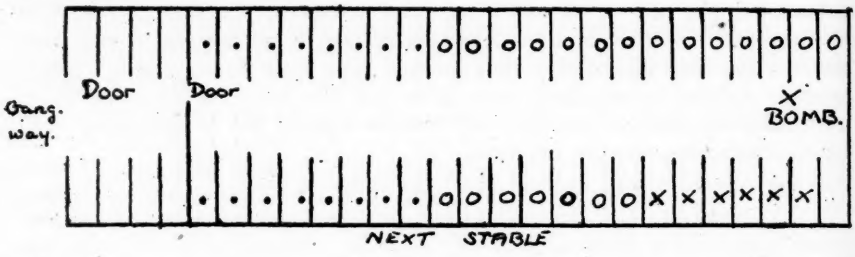
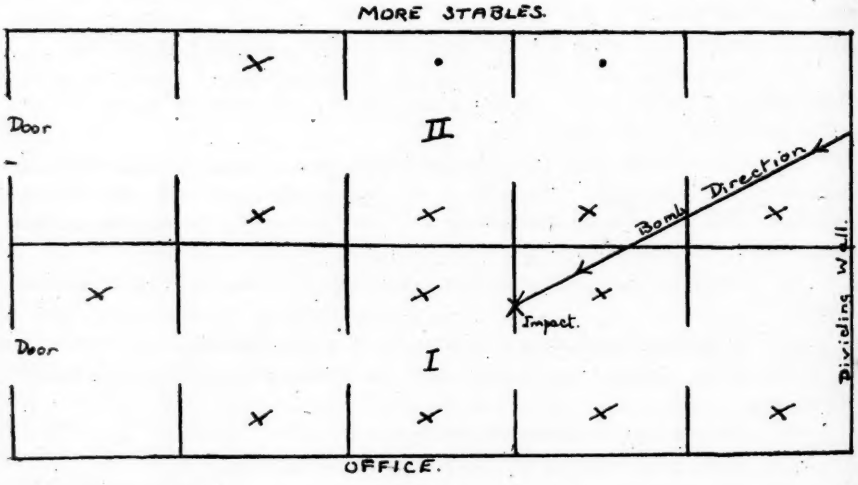
P_1.—A large bomb exploded some yards from a stable containing ninety horses. One wall collapsed burying one horse, whose injuries when rescued proved so extensive, externally and internally, that it had to be destroyed.

P_2.—Another bomb penetrated the same building, its case ripping open when passing through the floor two feet behind a horse. It did not explode and the horse suffered no ill-effect.



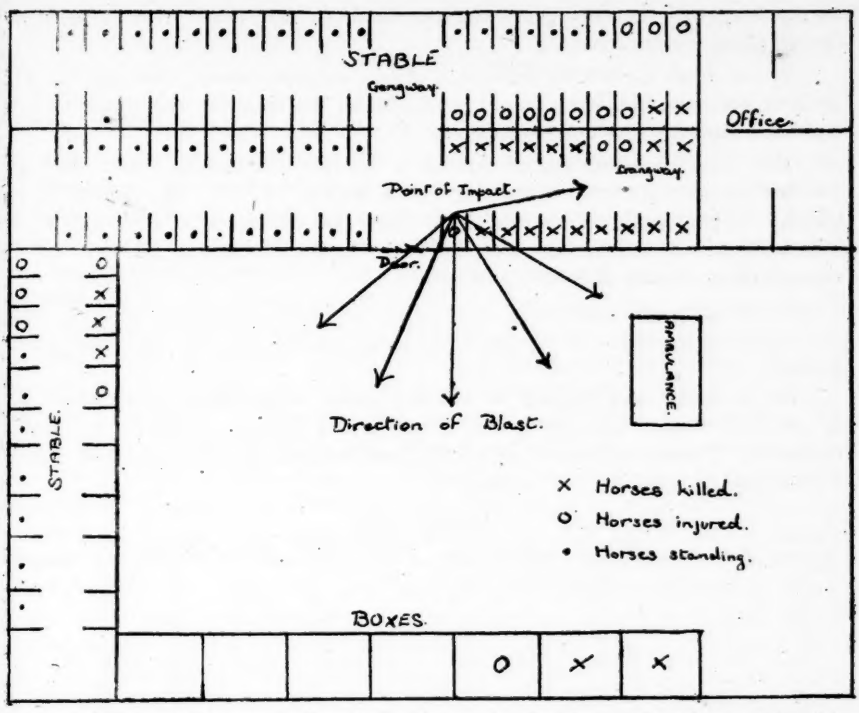
× Horse killed o Horse injured • Horse clear, uninjured.



× Horse killed • Horse unhurt.

Q.—A stud of forty-two horses was housed in three upstairs stables above their vans. A bomb caused the floor of one stable to collapse, impaling the horses on top of the vans. Twelve horses died as the result of broken backs and other injuries. Post-mortem examinations were difficult as it took a very long time to salvage the bodies, two never being recovered at all.

R.—Five hundred horses were stabled in ten stables of fifty each when a bomb hit the first stable in the row. There was no loft or big roof above the horses so that all wounds were shrapnel wounds. A total of seven horses were killed direct by shrapnel or blast from the bomb, which fell at one end of the gangway between the two rows of horses. One horse was destroyed



as its skin was like a pepper-box from shrapnel. One horse died from peritonitis due to an abdominal shrapnel wound, and one died from pneumonia following a shrapnel wound on the chest wall. Eighteen horses made good recovery and went to work within two months, none being any the worse for their experience.

G_1.—An incendiary bomb set the straw on fire in a very old wooden building housing twenty-four horses. One horse caught fire, which was extinguished, and tannic acid applied immediately. After three months' treatment of the whole lower aspect of its body the horse recovered.

G_2.—A beam was dislodged by a bomb and fell on to off fore-cannon, causing severe ostitis which did not yield to treatment after two months and the horse had to be destroyed.

T.—A bomb fell between twenty horses housed above vaults of a brewery, causing the floor to collapse and three animals to fall down and break their backs. A fourth animal was exposed to severe blast and was unfit for further work due to its highly excitable state.

U.—A large bomb dropped near a stable underneath a big warehouse. The side of the stable nearest the bomb caved in. Three horses out of ten were injured, mostly minor injuries, but one horse had a hook driven through the side of its face into the mouth. As the wound did not respond to treatment the horse had to be destroyed. A horse which was in a loose box outside the stable, about thirty yards away from the bomb, was killed instantly by blast without any outward signs of violence. On post-mortem a complete collapse

of the lung was the only gross change noted, so that death must have been due to physiological causes.

V.—A bomb caused the roof of a stable, weighing about two tons, to fall on nine horses. Two horses were cut badly on the back but recovered. They had been buried for twenty-four hours.

W.—An H.E. bomb passed through a hay-loft and exploded near the wall dividing two stables, each containing seven horses. All but two horses were killed. In the stable where the bomb went off all animals were killed by blast. In the other stable five were killed by the roof collapsing on them. The two surviving horses showed no injuries.

Y.—A stable collapsed on top of a pony after a bomb had fallen close by. The pony was lame on the off foreleg from extensive bruising but recovered after a week.

Z.—A horse was stabled in a small stable which suffered a direct hit by an H.E. bomb. The horse was found in the bottom of the crater totally unharmed. The manger out of which the horse was eating at the time was found on the roof of a house, 230 yards away.

Casualty List

Case Incident	Injuries				Destroyed		Total	Total	Total	No. in	Remarks
	Blast	Shrapnel	Fire	Building	Killed	or died	dead	injured	Casualties	Stud	
C_1	—	—	—	5	5	—	5	—	5	22	
C_2	4	—	—	5	9	—	9	—	9	9	
E	—	—	12	—	12	—	12	—	12	12	
F	—	7	—	4	—	—	—	11	11	63	
G	—	—	—	3	—	1	1	2	3	19	
H	—	—	—	1	—	1	1	—	1	12	
K	—	—	—	1	—	—	—	1	1	15	
L	—	—	—	3	1	—	1	2	3	3	
M	5	21	—	17	24	2	26	17	43	107	
N	—	—	3	—	—	—	—	3	3	82	
O	—	—	1	—	—	1	1	—	1	1	
P	—	—	—	1	—	1	1	—	1	90	
Q	—	—	—	12	12	—	12	—	12	42	
R	7	21	—	—	7	3	10	18	28	500	
S	—	—	1	1	—	1	1	1	2	24	
T	1	—	—	3	3	1	4	—	4	42	
U	1	—	—	3	1	1	2	4	6	12	
V	—	—	—	2	—	—	—	2	2	9	
W	7	—	—	5	12	—	12	—	12	38	
Y	—	—	—	1	—	—	—	1	1	1	
Z	1	—	—	—	—	—	—	—	—	1	
Total:											
21	26	49	17	67	86	12	98	62	160	1,104	

Conclusion

In twenty-one incidents to twenty studs, comprising 1,104 horses, we had 160 (14.5 per cent.) casualties of which ninety-eight were fatal and sixty-two recovered.

Part II

Description of Injuries

(*a*) *Blast.*—Twenty-six, or 16 per cent., of the casualties were due to blast. All but two were fatal. The post-mortem findings in cases of death through blast were not very conclusive, showing very little except a complete collapse of the lung. The post-mortem examinations we made were very few as the animals were usually buried deep under debris which was not cleared for many days, and when the carcass was recovered it had decomposed to such an extent that recognition was impossible. In some cases carcasses had to be abandoned altogether as it would have taken weeks to clear the debris. In those cases they were sprinkled liberally with quick-lime.

It was rather difficult to find anything definite about the action of blast on horses in an urban area. The various objects thrown about by the blast are more dangerous to the horse than the blast itself, which accounts for the large number of horses killed and injured by buildings. A horse which is exposed to blast in an open space can withstand considerably higher pressure than in an enclosed space. The direction of the blast seems to make little difference. As blast travels round buildings and is deflected by walls, any protection against blast is not, at present, possible. In incident N the stable was so flimsy that the horse took no harm, but if a bomb falls into a place enclosed by brick walls the pressure will affect horses. Generally speaking, the larger the animal the more susceptible it is to blast. The horse killed by blast in incident U was eighteen hands high. The exact distance from which a horse can be killed by blast is difficult to determine as partitions, etc., deflect it to a great extent. Usually, when a horse is very near the explosion, it is difficult to find out whether the shrapnel from the bomb or the air-pressure killed it. Although we were not able to prove it, we concluded that the horse injured by blast in incident T suffered from a ruptured blood vessel on the cerebrum as its symptoms very closely resembled that condition. Unfortunately, this horse was sold, and we have no further history.

(*b*) *Shrapnel.*—Shrapnel is all pieces of metal, etc., into which a bomb or shell disintegrates upon explosion. It was responsible for forty-nine, or 30 per cent., of all casualties. It is the most troublesome of all air-raid injuries from the surgical point of view. It may enter any part of the body and bury itself deeply into the tissue, particularly muscles. It is usually sterile, and in these cases the wound itself may heal and the shrapnel remain inside the body for many months, after which it may appear at a totally different place from its point of entry. This happened in one case in incident R, when a horse with a sore shoulder about two years after the bombing was found to have a piece of shrapnel in the bottom of the lesion, although at the time there had been no wounds in that region.

(*c*) *Shrapnel buried in tissue.*—This is usually quite easy to diagnose. A probe of sufficient length is introduced and after some searching we found the piece of shrapnel by the metallic noise it made against the probe. In about three cases we were unable to find the metal. It then caused a sinus which was difficult to treat, and in all cases but F6 destruction of the horse was ulti-

mately carried out. In the greatest number of cases, however, it was found a few days later when it had followed the general tendency of shrapnel to work its way to the surface. This sometimes took as long as one week. The *treatment* is quite simple. After locating the piece with the probe it has to be removed, if possible. When the wound is wide enough, it should be removed with forceps, as in the case of most wounds on the extremities and in the region of the ribs. In cases where it is too deeply buried or its forcible removal will cause too much tearing of tissue, it is best to cut down on to it before removal. This should be done from the point of the skin nearest to it and below it in order to allow for drainage. After the removal of the actual foreign body wound treatment follows on orthodox lines. In all cases of shrapnel wounds anti-tetanus treatment should be given. In severe cases sulphanilamide 2 to 4 oz. is indicated to prevent septicæmia.

A horse can receive fifty shrapnel wounds and, provided no vital structure is involved and *every* wound is attended to, it will survive. The case F6, which had a sinus which did not yield to treatment, shows that shrapnel will continue to irritate tissue for a long time if exposed to the open. We found that once the shrapnel is removed, acriflavine, either in a solution or emulsion, is the best dressing.

(*d*) *Shrapnel entering body cavities.*—This is always fatal. If the chest wall is punctured either collapse of the lung or traumatic pneumonia (case R) will supervene. If the abdominal cavity is opened, peritonitis is the outcome (case R). If the mouth is entered through the side of the cheek a fistula will form which, owing to the continued flow of saliva, does not yield to treatment. But, out of the forty-nine cases observed, only three were found in which a cavity was entered.

(*e*) *Injuries due to fire.*—Only seventeen, or 11 per cent., of all casualties were due to fire. Thirteen of these were fatal.

The usual course of events is that the bedding catches fire through an incendiary bomb. If there are attendants no further casualties are caused except to the horses immediately adjoining. When the corn or hay-loft catches fire there is time to evacuate the horses. A goat is said to have a steadying influence on a stud on these occasions but we had no opportunity to try that out.

Most of these cases show the burns on the underside of the chest and abdomen and inside the extremities. The feather of the shire horse is particularly liable to catch fire. The burning of any part of the horse is followed by a more or less severe shock and after eight to twenty-four hours by severe cellulitis and swellings. These swellings persist for a long time and may terminate in large infected areas, which will ultimately slough out. In any case, wounds by burning always take a long time to heal, and have to be attended to very carefully. In no case have we seen any scars following burning in the horse. The course of treatment we adopted was rather simple. We completely covered all burnt areas with a standard tannic acid jelly as soon after the occurrence as possible. We continued this treatment for two to seven days, after which

we changed to acriflavine emulsion. In case of threatened septicæmia we gave 2 to 4 oz. sulphanilamide. One of the horses in incident N had its face burnt rather badly and we had to feed it by drenching for about a week owing to the complete inability of the lips to hold any food. They were very swollen, but this subsided after a week. We did not treat the initial shock of burning but rather tried to minimise it by the speed with which we applied the tannic acid.

(*f*) *Injuries due to buildings, etc.*—These form by far the largest number of all air raid casualties, eighty-six, or 56 per cent. They are extremely varied and range from scratches to a broken spine. The majority of these injuries are just scratches of the skin, cuts, abrasions or bruises of the muscles, and can be treated as such. They are not always caused by the bomb itself but by the animal struggling after being buried by its stable. Generally speaking, the heavier the structure under which the animals are housed, the severer the casualties. It is always advisable to have nothing above or below the place where the horses are stabled. In incident Q the floor underneath the horses collapsed and precipitated them on to the vans with disastrous results. In incident T three horses simply fell to their death through the hole made by the bomb. There is no doubt in our minds that incident M was greatly aggravated by the iron-concrete floor which fell upon the horses. It is always a good idea, if possible, not to put horses directly under heavy beams. As most stables have few windows we had practically no casualties due to flying glass, except case M5. Wood splinters were also very few as the cause of casualties. Most casualties were caused by bricks, stones or metal, or heavy beams.

We found horses thrown by bombs into almost any position, e.g., on top of mangers, astride partition walls, suspended by their legs or head, or buried by slabs of concrete. But, apart from cases M_2 and M_4, no unusual wounds were met with. The greatest number of fatal casualties were from broken vertebræ involving the spinal cord. Fractures of extremities, while occurring, were rather fewer.

Treatment in all these cases followed orthodox lines. Every air raid casualty received anti-tetanic serum 3,000 units, and, if necessary, 2 to 4 oz. of sulphanilamide. As a general antiseptic we used acriflavine, which, as most external infections in the horse are due to streptococci, proved very effective. No case of tetanus was encountered, while pneumonia and septicæmia only occurred in cases which had not received any sulphanilamide.

The following other interesting occurrences took place during air raids.

(i) A large firm had to tie up their three horses for a night in a public park as their stable was bombed. Next morning their horses were gone. They were not traced for two months until they were found on a farm in the country whence they had been taken by an animal welfare society.

(ii) Thirty horses were taken out of their burning stable by the fire brigade and turned loose in the docks. Two fell into the water and were drowned.

(iii) About 250 horses were let out of their stable when it caught fire. They ran eight miles into a forest, from whence it took three weeks to collect them.

(iv) Apparently horses are not affected mentally in any way by air raids.

Sirens, the explosion of bombs and gun-fire, have no effect on horses, even those which have survived one bombing. Any claims that a horse has suffered mentally through being involved in a bombing incident should be regarded with grave suspicion as very few such cases seem to have occurred.

In the last few months we had to bring up to date our air raid precautions, which had been rather neglected after the death of Col. Stordy.

Under the direction of Major Smith, of the N.A.R.P.A.C., we have overhauled all our arrangements and we believe now to be able to deal with anything that may occur. Naturally, the horse is our main subject, as we found the casualties among dogs and cats to be very few.

Conclusions

(1) N.A.R.P.A.C. was a success as far as our region was concerned and its arrangements proved adequate.

(2) Out of twenty studs, with 1,104 horses involved in incidents, ninety-eight horses were killed and sixty-two injured.

(3) Eighty-six, or 56 per cent., of all casualties were due to buildings collapsing. Twenty-six, or 16 per cent., of all casualties were due to blast. Forty-nine, or 30 per cent., of all casualties were due to shrapnel. Seventeen, or 11 per cent., of all casualties were due to fire.

(4) Only one casualty occurred in the open air.

Recommendations

(1) House all horses, if possible, in stables on ground-floor level, with no floors above or below them.

(2) Keep all bedding out of the way of incendiaries.

(3) Never leave horses without an attendant during raids, and make adequate provision for them in case they have to be evacuated.

In conclusion, we wish to pay tribute to the N.A.R.P.A.C. In our district this organisation stood up to all tests. Our experience has proved its value. Criticism of this body has been made from time to time that it was unnecessary, etc. Much of this criticism has come from areas which were not affected by air warfare. We would point out that such a state of affairs is the best thing that could happen. To be prepared is the best safeguard in all dangers. It is not necessary or desirable to have casualties in order to justify the existence of such an organisation as N.A.R.P.A.C. Surely the ideal state should be that all arrangements were made but that there should be no work to do.

Clinical Case

COMPLICATIONS DUE TO ADHESIONS AT A CRYPTORCHID OPERATION

By Major C. W. TOWNSEND, T.D., F.R.C.V.S., and F. G. C. LAWFIELD, M.R.C.V.S.,
Long Stanton

THE following account of a cryptorchid operation is considered worth recording for the following reasons:

(1) The abnormal development and shape of the epididymis.

(2) The extremely strong adhesions which existed between the tunica vaginalis reflexa and the muscles forming the walls of the inguinal canal.

(3) The shape of the testicle, which was flat and heart-shaped.

Subject.—Four-year-old bay shire horse.

History.—When examined as a three-year-old one testicle had descended. The near-side testicle was removed one month previous to this operation. It is important to note that the whole history of the horse is known, and no previous attempt to operate could have been made, as this might have been the explanation of the adhesions.

Operation

After prenarcotisation with chloral hydrate per stomach tube, the animal was cast in the usual manner and chloroformed.

The skin incision was made over the external inguinal ring, and the underlying connective tissue broken down by blunt dissection, and a hand inserted just through the external inguinal ring.

Almost immediately inside the external inguinal ring a hard lump, a little larger than a walnut, was encountered, and at first it was thought that this was a testicle. The enveloping tissues were incised and it was then realised that this was not testicle, but probably epididymis or part of an abnormal vas deferens. Considerable traction was exerted on this without result, and it became obvious that it was firmly adherent to the walls of the canal.

By incising the adhesions and breaking them down a hand was eventually inserted into the abdomen and a search made for the testicle. Abdominal exploration at first failed to reveal the testicle, but on exerting further traction on the epididymis it was eventually located floating in the pelvis, and was brought out through the inguinal canal.

Traction on the testicle merely revealed the strong adhesions which were still holding the epididymis firmly attached to the muscles of the inguinal canal, and before the testicle could be removed with the écraseur these had to be laboriously broken down with the knife.

It is a fairly common incident in "Rig" operations to find a loop or a knuckle of cord in the inguinal canal. As a rule traction on this loop will bring the testicle into touch or view, such adhesions as occur are light and being easily broken down. From an examination of the specimen it appeared that there had been a rupture of the peritoneal covering of the cord and the adhesions were primarily between connective tissue elements in the cord and the fascia of the abdominal muscle. It was thought at first that fibres of the cremaster internus muscle were involved, but subsequent histological examination did not confirm this view.

It is of interest to note that the breaking down of adhesions would have been greatly facilitated if a herniatome had been available, an instrument not usually included in a list of instruments required for this operation.

This animal made an uneventful recovery and was returned to the owner within ten days.

Abstracts

THE DISTRIBUTION OF TRICHOMONAS FŒTUS IN THE PREPUTIAL CAVITY OF INFECTED BULLS*

By DATUS M. HAMMOND, Ph.D., and DAVID E. BARTLETT, D.V.M.

In order to determine the distribution of *Trichomonas fœtus* in the bovine preputial cavity, one naturally-infected and three experimentally-infected bulls were examined a total of fifteen times under epidural anæsthesia. In each examination light scrapings of designated areas of the penis and prepuce were made, and in eight of the examinations the lower urethra was flushed. The material obtained from each area was diluted and the approximate number of trichomonads it contained was determined.

The distribution of trichomonads in the preputial cavity was apparently correlated, to some extent, with the distribution of smegma. The area of the glans, not including the galea, characteristically had relatively large amounts of smegma : this area usually showed the highest number of trichomonads.

However, the distribution of smegma apparently was not the only factor involved in the distribution of trichomonads. This is indicated by the fact that the difference in the number of trichomonads in samples from two areas was frequently greater than could be accounted for by the difference in amounts of smegma. A marked difference in counts of trichomonads often occurred between samples from two areas with similar quantities of smegma.

All the samples of flushings from the urethra were negative, indicating that trichomonads did not ordinarily occur in the lower urethra in these bulls.

It was observed that the portion of the glans, not including the galea, possessed a characteristically rough, uneven surface. The degree of roughness varied in the different bulls. A similar uneven surface of this region was also seen in two non-infected bulls examined under epidural anæsthesia. Macroscopic examination of freshly-killed and formalin-fixed specimens taken from fifteen bulls in an abattoir showed that the surface of the galea glandis is relatively smooth, but that the rest of the glans has a surface characterised by a network of fine infoldings. These varied in degree of development from slight, irregular depressions, resulting in an appearance similar to that of pebble-grain leather, to relatively deep, closely arranged crevices, producing a papillate appearance. In sectioned material the epithelium of the portion of the glans not including the galea showed numerous, well-defined infoldings similar to those found by Abelein (1941).

The uneven surface of the portion of the glans, not including the galea, was probably a factor in the regular presence of larger amounts of preputial material in scrapings from this area as compared with the other areas sampled. Also, since this portion of the glans was found to harbour the highest number of trichomonads, it seems likely that in infections other than those lasting only a

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short time, trichomonads become established in the crevices formed by these infoldings, as suggested by Abelein. However, presence of trichomonads in these crevices has not yet been demonstrated by histological methods.

These infected bulls did not show any consistent abnormalities in the appearance of the penis and prepuce. In all the bulls, there were observed at times reddened pin-point areas, scattered particularly on the glans penis and adjacent area of the prepuce. An appearance similar to this has been described as characteristic of the chronic stage of infection in bulls, while more severe symptoms of inflammation were reported as being characteristic of early stages of infection (Küst, 1933; and others). In the present investigation, this abnormality in appearance was observed only occasionally and its presence was not correlated with a high number of trichomonads. Because of the inconsistency of their presence, the possible etiologic relationship of trichomoniasis to these lesions is open to question. Recent investigations (Riedmüller, 1939; Abelein, 1941) indicate that uncomplicated trichomoniasis does not produce any marked symptoms of balano-posthitis in bulls.

The findings with respect to distribution of trichomonads in the preputial cavity are of significance for diagnosis and treatment only if the preputial cavity is the chief or sole site occupied by the trichomonads in bulls.

In the present study, the fact that trichomonads were consistently demonstrated over a period of six months in the weekly preputial samples from all three of the permanently infected bulls agrees with Abelein's reported success in finding trichomonads in the preputial cavities of most infected bulls. The negative findings in the urethral flushings from all of the four bulls tend to show that trichomonads ordinarily do not occur in the lower urethra.

From the data available it, therefore, appears likely that the preputial cavity is the ordinary habitat of *T. fœtus* in bulls. Invasion of the internal urogenital organs, as reported by Futamura (1935) and Karlson and Boyd (1941), apparently occurs only in unusual cases.

The results of the present investigation agree with the observations of Abelein and Swangard in showing the general region of the glans and adjacent prepuce as the area where the greatest concentration of trichomonads occur. However, in Swangard's observations the regions of the tip of the glans and the prepuce lying in apposition to the glans were indicated as the specific areas of greatest concentration of trichomonads, while in the present study the glans other than the galea was found usually to have the highest number of trichomonads.

The finding that trichomonads are usually present in highest numbers on the portion of the glans penis, not including the galea, shows that the accuracy of diagnosis may be improved by making sure that the samples are obtained from this area. The possibility that the crevices in the surface of the glans may serve as a reservoir for trichomonads indicates that particular attention be given this area in treatment.

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EQUINE INFLUENZA AND RELATED RESPIRATORY DISEASES IN HORSES — EPIZOOTIOLOGICAL AND CLINICAL OBSERVATIONS*

By T. C. JONES and W. E. JENNINGS

THIS is an instructive account of a rather severe outbreak of respiratory disease at the Front Royal Remount Depot between autumn, 1939, and spring, 1941. The depot has two main functions—receipt, conditioning and issue of horses and mules purchased from civilians, and the breeding of specially desirable cavalry horses. A study is also made of disease and breeding problems of importance to the military service. The two above functions are carried out separately, and the personnel of the operations are also separate. The outbreak affected both units. It is pointed out that the different types of respiratory diseases was based entirely on clinical criteria. The authors diagnosed in this outbreak: influenza, strangles, purpura hæmorrhagica and pneumonia; the two latter being considered complications of influenza or strangles. The following symptoms were diagnosed as influenza—"sudden onset of high temperature (103 degrees to 106 degrees F.), marked weakness, depression, anorexia, congested

* *Army Vet. Bull.* 1943, xxxvii, 218.

mucosæ, cough, swelling of tendon sheaths or joint capsules and a course of about ten days." The symptoms of strangles showed frequently a very similar onset, but was usually complicated by severe rhinitis, pharyngitis, laryngitis and abscessation of the adjacent lymph glands (usually the submaxillary). The authors found difficulty in diagnosing pneumonia unless a considerable part of the lung is involved, and they think that "it is probable that many cases of localised pneumonia in horses are not diagnosed clinically." They found that the anterior and ventral parts of the lung are involved earliest and most frequently. Pneumonia was diagnosed on the basis of "dyspnœa, moderate to high fever, weakness and râles on auscultation." It is also pointed out that the diagnosis of pneumonia is facilitated by the use of the blood count—a severe neutrocytosis with a sudden onset usually indicating pneumonia in this disease. "Purpura hæmorrhagica is characterised by acute, sharply demarcated, œdematous and hæmorrhagic swellings of the subcutis and hæmorrhages in the nasal mucosa. The swellings are specially marked on limbs, face and lower abdominal regions."

Treatment.—Acute influenza cases were treated by the intravenous administration of 3.0 grams of neoarsphenamine in 30 c.c. of sterile distilled water at the start of the high fever. This was repeated when indicated on the following day. In addition, each animal was given absolute rest in a well-bedded box stall. Each animal was blanketed and derby bandages were placed on all legs. Bran mash and alfalfa with some timothy hay was the usual diet. Mineral oil and linseed oil were given as laxatives when indicated." For animals which developed severe coughs a throat pack was applied and the throat was massaged. The prescriptions of the mixture for massaging and the expectorant used in the outbreak are given. Abscesses were incised liberally when properly localised.

The epizootiology of the outbreak in the depot-raised animals is next dealt with. Each crop of foals is housed in separate stables, which were separated by half to two miles, and each stable had separate personnel. Pastures were provided; some were adjoining, but others were widely separated. In winter the animals were at pasture during most of the day and were housed at nights. The first case of respiratory trouble was found in a 1939 foal. The symptoms were those of typical influenza, complicated by acute iridocyclitis. Recovery was uneventful. The disease then spread throughout this and other stables. "Of particular significance is the fact that the outbreak started with typical influenzal symptoms, and later most cases were of a severe, complicated nature. Strangles occurred very commonly after the outbreak was well under way." The disease also spread to the brood mares and the very young foals. Often the mares became sick within 24 hours of foaling and their foals also were affected. "Among the brood mares, many of which had been in the band for over ten years, eight showed symptoms of respiratory disease. The symptoms among the young foals were very severe and the course prolonged. Of the 47 foals in the group at the onset, 40 showed symptoms. A very large number of these foals developed abscesses in the submaxillary and parapharyngeal lymph nodes. Some of these abscesses spread to the axilla, around the orbit, the face and other parts of the body. One mare developed purpura hæmorrhagica and two developed streptococcic mastitis after nursing their sick foal. Three foals died, but no mares were lost." There is evidence from the records that several

animals were affected more than once during the outbreak, though the predominant symptoms varied in some cases. In discussing this reinfection the authors state: "It appears likely that immunity to upper respiratory infection is only relative and reinfection may result if sufficient exposure to infection occurs. The prevailing opinion is that horses develop strong immunity of long duration after exposure to respiratory diseases. This opinion is based largely upon the fact that very few cases are encountered in Army animals after they have passed through a conditioning period in a remount depot. . . . It is possible that antigenically different viruses are involved when repeated attacks occur. It is also not unlikely that the type and amount of secondary infection encountered has some relationship to the immunity response."

In connection with purchased animals, respiratory infection is very common. Some are affected on arrival; others contract the disease some time after they have been at the depot. The severity varies greatly and is markedly increased by debilitating conditions such as cold, wet weather and long rail journeys.

Infection in seasoned horses is also dealt with. In a group of 496 animals returned to the depot—average age 10.9 years with service from one to 19 years and exposed at the depot to apparently equal chances of infection as the newly purchased animals, only 10 were treated for respiratory disease, and all the cases were mild in character. During the same time (November and December) the morbidity in newly purchased animals was 100 per cent., and the mortality rate 17.33 per 1,000 in November and 5.04 per 1,000 in December. The authors conclude that "It is apparent that the seasoned horses as a group possessed a high degree of immunity to the respiratory infection encountered at the Front Royal Depot."

The authors' summary is as follows:

A severe outbreak of equine respiratory disease which occurred at the Front Royal Depot during 1939 and 1940 is described. In the depot-raised foals cases of typical equine influenza appeared initially. As the enzootic progressed, the severity increased and complications became more frequent. At the height of the outbreak strangles was most commonly encountered; towards termination typical influenzal symptoms were again more frequently encountered. Evidence of repeated attacks of equine influenza is presented. However, most Army horses develop a strong immunity after exposure to respiratory infection at a remount depot. One group of 496 seasoned horses was exposed to severe infection, and only a very few developed symptoms. In recently purchased animals respiratory disease is practically always present. The severity of the disease is greatly increased by long rail shipments, exposure to cold, wet weather and repeated exposure to contaminated stockyards.

JOHNE'S DISEASE OF GOATS*

By M. W. EVELETH and D. F. EVELETH

THE authors refer to an earlier publication (D. F. Eveleth and Rebecca Gifford, 1942: Johne's disease in farm animals, *Jnl. of the Amer. Vet. Med. Assn.*, 27, 1), in which there appeared records of johnin tests on 263 goats, 24

* *Vet. Med.* 1943, xxxviii, 258.

per cent. of which reacted positively. The present paper deals with work on five more herds of goats. Flock 1 consisted of 48 goats—15 reacted positively to johnin. It is stated that on the same farm cattle, sheep, horses and mules also reacted positively to johnin. Although no clinical evidence of the disease was found in the goats at the time of the test, acid-fast organisms were demonstrated in intestinal smears of two lambs pastured with the goats. Helminth infestation was marked, and pasture rotation and the use of anthelmintics reduced the losses. In flock 2, 48 of the 215 goats reacted to johnin; a further three gave slight reactions to mammalian tuberculin, but at a later test were negative to both johnin and mammalian tuberculin. No clinical evidence of Johne's disease has been found in the flock. Flock 3 was not tested with johnin, but several goats showed post-mortem evidence of the disease (acid-fast organisms similar to Johne's bacilli in intestinal smears). All the goats were heavily parasitized. Selling off the unthrifty goats was done and no further losses have been reported. Flock 4 had lost several goats showing emaciation and diarrhœa. Johnin tests failed to produce positive reactions in three affected animals, which at post-mortem examination failed to show lesions of Johne's disease or acid-fast organisms in intestinal smears. The use of anthelmintics was practised and apparently controlled the trouble. The authors point out the great difficulty in differentiating, upon clinical grounds, between Johne's disease and parasitism. The history of flock 5 points more definitely to the presence of Johne's disease in the goats. The herd was apparently healthy until two unthrifty goats were purchased and added to it. Both showed diarrhœa and one died. Within six months of the introduction of these two animals diarrhœa became prevalent in the original flock. Anthelmintic treatment failed to effect an improvement, and some of the goats died. The history of two cases is given. From the ileum and cæcum of one of the goats and the abomasum, duodenum, cæcum and mesenteric lymph nodes of the other acid-fast organisms indistinguishable from Johne's bacilli were demonstrated in smears. In neither of the animals was there evidence of marked changes (thickening, etc.) of the mucous membrane of the intestine. Only a few intestinal parasites were found. Johnin tests were carried out on 30 goats in the flock—one male, 17 females, 10 yearlings and two kids. General unthriftiness, diarrhœa and emaciation were prevalent. Positive reactions were found in 22. In the discussion the authors point out that clinical examinations are not helpful in differentiating between Johne's disease and heavy infestations with gastro-intestinal parasites: although fæcal examinations for ova and larvæ are of some assistance they are of little use when both conditions are present. Goats do not seem to pass many of the organisms in the fæces: in this respect they resemble sheep and differ from cattle. Therefore negative findings in fæcal smears do not help much in diagnosing Johne's disease in goats and sheep. The intradermal johnin test is of limited value in the diagnosis of advanced cases of Johne's disease; it was observed, however, that following the injection of the johnin in cattle, sheep and one goat, severe diarrhœa occurred. It is also pointed out that poor production is common in herds and flocks in which there are numerous clinical cases of Johne's disease, and that abortions are not uncommon.

XUM

Correspondence

Parasitic Aneurism in Foal

SIR,—The case of parasitic aneurism in a foal, reported on page 245 of your journal by Miss M. L. Bingham, interested me very much, as I have to offer a possible solution of the puzzle—that is, why the strongyle was present in the aneurism but not in the intestine.

Long ago I remember reading a report of a meeting—I think, of the Lincolnshire Veterinary Association—about the value of cow's milk in the treatment of unthrifty young horses with strongyles. In my practice at Stamford, cases of unthriftiness and debility and chronic scouring as a result of "red worms" frequently occurred, and I adopted a treatment which, although it would be frowned upon in these days of war, gave me success deserving to be called phenomenal, as it never failed to cure, even when animals were almost moribund (unable to rise without assistance) before treatment was applied.

It consisted of reserving the milk of a cow for the young horse's food supply for about a fortnight, after which the milk supply was gradually reduced until it was altogether withdrawn after the third week. By withholding water for twenty-four hours or less, the colt would soon drink diluted milk, and, in a couple of days, would display the greatest anticipatory enthusiasm whenever he heard the rattle of a bucket-handle, and would drink cow's milk neat. A fortnight of this, whilst hay and sometimes a few oats (after scouring had ceased) were also supplied, and he would be well on the way to recovery without relapse. I do not think that any worm medicine given had anything to do with these steady recoveries; it was before the days of phenothiazine.

I therefore presume that the strongyles in the intestine cannot stand a cow's milk diet; and, if mare's milk has the same effect, it seems that the worms only flourish when the patient is herbivorous and not when it is temporarily on an animal diet like milk.

Miss Bingham's case (Mr. Tutt's patient) died at the age of about four months, when it would still be "semi-carnivorous." If my solution is correct, there is no reason to be surprised that no strongyle eggs could be found in the dung of the foal.

Miss Bingham quotes authorities who believe that strongyles can cause aneurisms in foals prenatally. Not being an authority on helminths myself, I cannot see why strongyles which, as we know, can pass somehow from the dam's intestine to the dam's tissues and arteries, could not also pass into the tissues and arteries of her fœtus, where no amount of milk ingested after birth could interfere with their activities.

If my view is correct, Wetzel's experiment (quoted by Miss Bingham) on a four months' foal is not conclusive on the question of the time required between ingestion of larvæ and sexual maturity of *S. vulgaris;* because a partly milk-fed foal is not a suitable subject to use for such an investigation.

It should be easy to ascertain if any young foal ever carries strongyles in the intestine.

Yours faithfully,

20, Pewley Hill, Guildford, Surrey. ARNOLD S. LEESE, M.R.C.V.S.

September 26, 1943.